# Unconscious Bonding

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Chapter 5

# Virtually Satisfied: How Digital Interactions May Leave Us Longing for Belonging

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**Abstract**

Internet-based communication has changed the way people socially interact and how people follow up on their relationships. Especially in terms of need satisfaction, it is not clear whether digital interactions compared to face-to-face interactions fulfill the need to belong in the same way. In three studies, we test how webcam interactions compare to face-to-face interactions in terms of satisfying the need to belong. In Study 1, people generally evaluated digital interactions as poorer means for satisfying the need to belong compared to face-to-face interactions. In Study 2, nonverbal behavioral mimicry by a confederate increased ratings of belonging in a face-to-face interaction, but not over a webcam interaction. In Study 3, participants primed with images of digital (versus face-to-face) interactions subsequently placed two chairs closer together for an upcoming interaction, suggesting increased "longing for belonging". Although digital interactions may often be effective substitutes for direct face-to-face contact, our findings suggest digital interactions may not satisfy the need to belong to the same extent.

## Virtually Satisfied? How Digital Interactions May Leave Us Longing for Belonging

Digital interactions are an increasing part of modern life and are becoming a regular substitute for face-to-face interactions in one's interpersonal relationships. Yet digital interactions differ from face-to-face interactions in terms of how the quality and the impact of interpersonal and intrapersonal information is conveyed (e.g., Bayles, 2012). A basic question is whether digital interactions are as good as face-to-face interactions in all respects. In the present paper, we consider how webcam interactions compare to face-to-face interactions in terms of satisfying the need for social belonging. Digital interactions may not be as effective in conveying social cues to belonging and mere exposure to digital interactions may leave people longing for belonging.

Social belonging is often considered a basic psychological need and research suggests people hunger for belonging when it is absent (Baumeister & Leary, 1995; Gardner, Pickett, & Brewer, 2000). Yet, the need to belong can be hard to satisfy in physically distant social situations (Baumeister & Leary, 1995), and it is not clear whether people fully overcome the inherently virtual nature of digital interactions to satisfy their belongingness needs. On the one hand, digital interactions can be useful to connect and communicate with others; for example, elderly people's health increases when playing digital video games (for a review see Hall, Chavarria, Maneeratana, Chaney, & Bernhardt, 2012). On the other hand, digital interactions are also limited in that they provide sight and sound but not touch—and this barrier is categorically insurmountable. This leads us to ask whether people hold lower expectations for digital interactions and whether digital interactions are less sensitive to convey nonverbal cues to belonging when engaging in them – potentially undermining psychological need satisfaction.

We consider this question in light of burgeoning evidence suggesting that social cues over digital interactions have similar effects as face-to-face interactions: The virtual ball-tossing game "Cyberball" is widely used to manipulate social rejection (Hartgerink, Van Beest, Wicherts, & Williams, 2015). In this digital game, participants are told that they will engage in a ball tossing game with two other participants located in different rooms. In fact, the other two players are operated by the computer, which – depending on condition – will either include or exclude the participant into the game, namely that the ball is

(not) thrown to the participant. Furthermore, people assign more positive traits and are even more strongly persuaded by a digital avatar who copies their head movements than an avatar who uses pre-recorded head movements (Bailenson & Yee, 2005). People even (unconsciously) apply the same social norms for copying each other when interacting with a confederate in a video (Yabar, Johnston, Miles, & Peace, 2006; Stel, Blascovich, McCall, Mastop, Van Baaren, & Vonk, 2010). Yet, these studies mainly make use of interactions with digital characters or pre-recordings, why it might be questionable whether the same positive effects can be expected for webcam interactions with a beloved one.

Moreover, it is unclear whether especially the need to belong can be satisfied in the same way: digital interactions tend to be negatively associated with feelings of connectedness and may not yield the same effects for happiness as face-to-face interactions (Clerkin, Smith, & Hames, 2013; Vlahovic, Roberts, & Dunbar, 2012). Chatting online can increase feelings of loneliness and digital romantic relationships are weaker than face-to-face romantic relationships (Hu, 2009; Scott, Mottarella, & Lavooy, 2006). Although people may turn to digital interactions to pursue belonging, it is not clear they can fully satisfy it and some studies go as far as to suggest they leave people still longing for belonging (e.g., Bayles, 2012). Therefore, it still remains unclear how effective digital interactions are in comparison to face-to-face interactions.

The difference between face-to-face and digital interactions might occur due to (1) pessimistic belief people hold about digital interactions and (2) the inability of digital interactions to convey the whole range of human behavior, namely the implicit nonverbal behavior. These two aspects might influence each other and it is not clear whether people first experience a dissatisfaction in the perception of nonverbal cues when engaging in digital interactions or whether the pessimistic beliefs restricts people from being responsive to nonverbal cues. Yet, both aspects seem to influence the experience of the need to belong and might leave people with a longing for it. Note that people may still be sensitive to nonverbal cues over digital interactions in some ways (e.g., to infer positive traits about a mimicking avatar, see Bailenson & Yee, 2005), yet the two-dimensional display, communication lags, and other factors – such as a lack of eye contact – can reduce responsiveness and empathy (e.g., Bavelas, Black, Lemery, & Mullett, 1986). Reduced responsiveness to one's interaction partner can undermine

relationship satisfaction and belonging (Kane, McCall, Collins, & Blascovich, 2012; Chartrand & Van Baaren, 2009). Therefore, people may explicitly regard digital interactions as inferior and nonverbal cues might be conveyed and perceived differently compared to face-to-face interaction so that people will experience belonging to a lesser extent.



When we talk about nonverbal cues, we mean nonverbal behavioral mimicry – the copying of the postures and mannerisms of others. Mimicry is considered as a means to affiliate and known as a "social glue" that binds people together (Chartrand & Van Baaren, 2009). For example, people who are mimicked like their interaction partner more and also act more prosocial towards this person (Chartrand & Bargh, 1999; Van Baaren, Holland, Kawakami, & Van Knippenberg, 2004). Importantly, mimicry and the need to belong are positively associated in face-to-face interactions (Duffy, Stanton, Chartrand, & Harris, 2014) and mimicry, therefore, seems to be an important factor to experience belonging. Yet, due to the limitations of digital interactions in terms of two-dimensional display and delays or interruptions, nonverbal cues might not be conveyed in the same way as it would be the case in face-to-face interactions. If people lack the experience of mimicry, which normally is expected in relationships with others (Leander, Chartrand, & Bargh, 2012), people might not experience the satisfaction of their need to belong.

We further propose that digital interactions are not only unsatisfying; they could subsequently leave people motivated to seek belonging. Unfulfilled goals linger in the minds of their pursuers (Goschke & Kuhl, 1993; Masicampo & Baumeister, 2011) and we predict that mere exposure to digital interaction cues (vs. face-to-face interaction cues) leaves people more motivated to seek belonging because such cues invoke the need but not necessarily the means to satisfy it. Thus, when we refer to "longing for belonging", we mean that after exposure to cues of digital interactions, people are more motivated for need satisfaction and thus may behaviorally seek out greater physical closeness to others.

**The Present Research**

We conducted three experiments to test the antecedents and consequences of digital interactions as being not as good as face-to-face interactions in

satisfying the need to belong. We specifically test whether people generally hold pessimistic beliefs about their effectiveness to satisfy the need to belong (Study 1), whether people are less likely to feel a sense of belonging when mimicked over a digital (versus face-to-face) interaction (Study 2), and whether motivation for physical closeness to others — an indicator of motivation to seek belonging, is higher after mere exposure to digital as opposed to face-to-face interactions (Study 3). Finally, we conducted a meta-analysis (see Goh, Hall & Rosenthal, 2016) over all our three studies to test whether digital interactions do not fulfill people's need to belong as good as face-to-face interactions do.



## Study 1

In our first study, we test whether people generally hold pessimistic beliefs that digital interactions are less likely to satisfy the need to belong than face-to-face interactions are. In the present study, participants rated the quality of digital interactions in regard to fulfilling the need to belong either before or after rating face-to-face interactions on the same direction (counterbalancing order).

### Method

**Participants & Design.** Seventy-two participants (34 female, 38 male, all but three were German) completed an online questionnaire.[1] Their ages ranged from 17 to 62 years ($M$ = 23.76; $SD$ = 8.79). Four undergraduate research assistants invited the participants via social networks (e.g., Facebook). Each participant received questions about face-to-face and digital interactions (within factor) in counterbalanced order (face-to-face first vs. digital first; between factor).

**Procedure & Materials.** Participants clicked on a link distributed via different social networks and were randomly assigned to one of the two questionnaires. They were told that the study aims to find out what people think about interactions between human beings. Embedded in a questionnaire was a set of questions that asked participants to indicate their agreement with six belongingness items in either face-to-face or digital situations (in counterbalanced order, see Appendix C). Participants gave their responses on a 7-point Likert scale ranging from *not at all* to *extremely*. The six belongingness items formed a reliable scale ( $\alpha$ = .88). Participants also indicated their demographics and filled

out a funnel debriefing. Finally, they were thanked and offered to receive the outcomes of the study. The questionnaire was carried out in German.

**Results and Discussion**

To test whether people hold pessimistic beliefs that digital interactions are not as good as face-to-face interactions in fulfilling the need to belong, we conducted a 2 (source: face-to-face vs. digital, within factor) x 2 (order, between factor) mixed-model ANOVA. Results indicated a large main effect for source, $F(1, 70) = 63.06$, $p < .001$, $\eta_p^2 = 47$. Participants reported much lower feelings of belonging from digital interactions ($M = 3.81$, $SE = 0.13$, $CI_{95\%} = [3.55, 4.08]$) than from face-to-face interactions ($M = 5.02$, $SE = 0.13$, $CI_{95\%} = [4.76, 5.29]$). The analysis also indicated a marginally significant main effect for order, $F(1, 70) = 3.34$, $p = .07$, $\eta_p^2 = .05$, simply suggesting that participants' first rating tend to serve as an anchor for their second rating, and no two-way interaction, $F(1, 70) = 0.84$, $p = .36$.



In sum, Study 1 suggests people believe digital interactions are not as good as face-to-face interactions in satisfying the need to belong. This is just an initial finding, however, and participants could have easily realized the study pertained to the relative quality of digital versus face-to-face interactions. To circumvent potential demand characteristics, Studies 2 and 3 use implicit and indirect measures. Specifically, in Study 2, rather than testing beliefs we manipulate nonverbal behavioral mimicry and assess whether participants mimicked over a digital interaction report less need satisfaction than those mimicked in a face-to-face interaction.

## Study 2

Effective communication often depends on sensitivity to nonverbal cues (Reiman, 2007; Schachner, Shaver, & Mikulincer, 2005), which might be reduced in digital interactions. Digital interactions are limited in the way they display a person and are characterized by disruption and delays, while touch is not possible. These drawbacks might influence people in how they perceive the fulfilment of the need to belong, namely that the need to belong is not fulfilled as good as in face-to-face interactions. In Study 2, we investigate whether mimicry over a digital interaction is indeed less likely to convey belonging than mimicry over a face-to-face interaction.

## Method

**Participants & Design.** Eighty-three first year psychology students (53 female, 30 male) from a Dutch university participated in exchange for course credit. All participants were native German speakers and the study was carried out in German. Their ages ranged from 18 to 25 years ($M$ = 21.02, $SD$ = 1.43). We used a 2 (mimicry vs. no mimicry) x 2 (face-to-face vs. webcam) factorial design, with random assignment.



**Procedure & Material.** Students came into the lab, filled out an informed consent and were paired with a confederate. After a brief introduction, the confederate either stayed in the room (face-to-face condition) or was moved to another room (webcam condition). In the face-to-face condition, the participant and confederate sat facing each other in a 45-degree angle with a table between them (Chartrand & Bargh, 1999).[2] In the webcam condition, the participants and confederate interacted over Skype and were also positioned at a 45-degree angle. The confederate's digital image was projected onto a wall to make the physical appearance (from head to knee) as real as possible and matched in size and visual scope to the face-to-face interaction. The interaction consisted of a picture description task, in which the participant and confederate describe pictures to each other in turns (see Chartrand & Bargh, 1999). During the interaction, the confederate either mimicked or did not mimic the postures and mannerisms of the participants (e.g., crossing the legs when participant crosses the legs; Chartrand & Bargh, 1999). The interaction lasted about 10 minutes

Participants then completed a questionnaire battery that included our critical dependent measures. A five-item belonging scale was drawn from Van Beest and Williams (2006). Participants rated on a 5-point scale from *not at all* to *extremely* how much they agreed with each item (e.g. "I felt as one with the other participant", $\alpha$ = 0.76).

We assessed trust as a manipulation check to ensure mimicry was successful across the digital and face-to-face conditions. Note that participants tend to be unaware of mimicry manipulations (Chartrand, Maddux, & Lakin, 2005), which means participants cannot self-report whether they were mimicked or not. Yet past research suggests mimicry enhances feelings of trust (Maddux, Mullen, & Galinsky, 2008), and trust can be inferred after just a few milliseconds of

exposure (Willis & Todorov, 2006). Hence, we reasoned that a successful mimicry manipulation would increase trust across the digital and face-to-face interaction conditions, even if the digital interaction attenuated any effects on belonging. The five items of the trust measure (a subscale from Zaheer, McEvily, & Perrone, 1998) were rated on a 7-point scale from *disagree* to *agree* (e.g. "The other person is trustworthy", $\alpha = 0.67$).



Participants subsequently entered their demographics and completed a funnel debriefing (e.g. "Did you recognize any gestures or postures during the interaction?"). No participants indicated any suspicion of mimicry.

**Results and Discussion**

Manipulation check: Trust. An initial 2 (mimicry vs. no mimicry) 2 (source: face-to-face vs. digital) ANOVA on trust indicated only a main effect for mimicry, $F(1, 79) = 4.41$; $p = .039$, $\eta_p^2 = .053$ and no single ($F(1, 79) = 2.75$, $p = .10$) or interactive effect of source ($F(1, 79) = 0.83$, $p = .36$). Regardless of whether the interaction was face-to-face or digital, participants who were mimicked ($M = 4.02$, $SE = 0.14$, $CI_{95\%} = [3.75, 4.29]$) reported more trust towards the interaction partner than those who were not mimicked ($M = 3.61$, $SE = 0.14$, $CI_{95\%} = [3.34, 3.89]$). This suggests that the mimicry manipulation was successful across conditions.

Belonging. To test our hypothesis that people in digital interactions are less responsive to nonverbal cues to belonging (but not trust), we conducted a 2 (mimicry vs. no mimicry) 2 (face-to-face vs. digital) between subject ANOVA on the belonging measure. Results indicated a just-significant interaction, $F(1, 79) = 3.96$; $p = .050$, $\eta_p^2 = .048$, and no main effects ($ps > .37$).3 As illustrated in Figure 4, simple effects analyses indicate that participants in the face-to-face condition reported higher belonging when mimicked ($M = 3.37$, $SE = 0.13$, $CI_{95\%} = [3.10, 3.64]$) as opposed to not mimicked ($M = 2.99$, $SE = 0.13$, $CI_{95\%} = [2.72, 3.26]$; $p = .048$); participants in the face-to-face condition who were mimicked also reported higher feelings of belonging than participants in the digital condition who were mimicked ($M = 3.01$, $SE = 0.12$, $CI_{95\%} = [2.76, 3.26]$; $p = .055$). Critically, there was no effect of mimicry in the digital condition on belonging (mimicry: $M = 3.01$ vs. no mimicry: $M = 3.15$, $p = .433$).

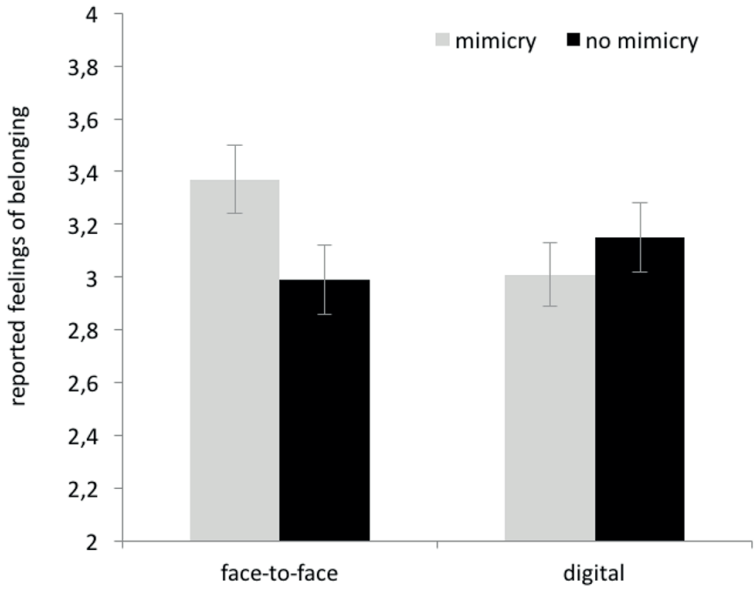


Figure 4: *Reported feelings of belongingness in a face-to-face situation compared to a digital interaction.*

In sum, mimicry increased feelings of belonging in the face-to-face condition but not in the digital condition. This result supports our assertion people are less responsive to nonverbal cues to belonging in digital interactions. In Study 3, we sought to extend our findings to show that when compared to face-to-face interactions, digital interactions leave people still motivated to seek belonging.

### Study 3

If the absence of belonging does indeed increase social hunger (Gardner et al., 2000), mere exposure to cues to digital interactions could leave one motivated to seek belonging. Unfulfilled need states can be triggered by primes (Hawkins, Richards, Granley, & Stein, 2004); even something as simple as a mobile phone on a table can undermine the perceived quality of a relationship (Przybylski & Weinstein, 2013). As the need to belong seems to be only satisfied in physically close, but not distant situations (Festinger, Schachter, & Back, 1950; Baumeister & Leary, 1995), we propose that after mere exposure to cues to digital (vs. face-to-face) interactions, people will be motivated to create physical closeness between

them and other people. This may manifest in them placing two chairs closer together in anticipation of an upcoming interaction.

## Method

**Participants & Design.** Fifty-six participants (43 female, 12 male, 1 not reported) from a Dutch University were recruited in exchange for partial course credit. A plurality of participants was of German origin (48%). Their ages ranged from 18 to 29 years ($M$ = 20.66, $SD$ = 2.26). The study used a one-way (prime: digital vs. face-to-face) design.



**Procedure & Material.** Participants were invited into the lab and told the study was about color influencing discussion behavior. After completing the informed consent, participants were immediately given the priming task meant to invoke thoughts about either digital or face-to-face interactions. They received a deck of 30 DIN A5 cards in different shapes of blue and yellow and were asked to sort them according to their color. The 30 cards consisted of 20 neutral cards (e.g., landscapes) and ten cards that depicted either digital (e.g., Skype) or face-to-face interactions. We matched the pictures of digital versus face-to-face interactions according to apparent gender, age, number of people, body position (e.g., seated, lying on the floor), as well as the broader camera angle. Motivational primes tend to strengthen over time (e.g., after a five-minute delay; Bargh, Lee-Chai, Barndollar, Gollwitzer & Trötschel, 2001), so to ensure that the predicted effect was indeed motivational, we included a brief filler questionnaire battery (which had no bearing on the results). For the dependent measures, participants were then told the last part would be a discussion between them and another participant. They were asked to set up two chairs while the experimenter went to go get the other participant. Our dependent measure was the physical distance between the two chairs set up by the participants (in centimeters, see Storms & Thomas, 1977; Vohs, Mead, & Goode, 2006). Participants who placed the chairs closer together were presumably more motivated to seek belonging.

## Results and Discussion

We conducted a one-way ANOVA (digital vs. face-to-face) to test whether merely priming the idea of digital interactions triggered a longing for belonging

in participants—as manifested in them placing two chairs closer together in anticipation of an upcoming interaction. Results indicated the predicted main effect, $F(1, 54) = 4.59$, $p = .04$, $\eta_p^2 = .078$. Participants who received the digital interaction primes placed the chairs closer together ($M = 46.10$ cm, $SE = 5.00$, $CI_{95\%} = [36.09, 56.12]$) than participants who received the face-to-face primes ($M = 61.51$ cm, $SE = 5.18$, $CI_{95\%} = [51.13, 71.90]$). In other words, participants primed with digital interactions subsequently demonstrated greater longing for belonging.



## Meta-Analysis

To test how digital interactions compared to face-to-face interactions in terms of satisfying the need to belong across the three studies, we conducted a meta-analysis with a fixed effects design and followed the procedure of Goh, Hall and Rosenthal (2016). For Study 1, we included only the within-subject manipulation (face-to-face vs. digital) and disregarded the between-subjects manipulation. Specifically, we calculated Cohen's *d* and Pearson's correlation for each of the three studies. Then, we transformed the correlations to Fisher's z (see Table 1 for relevant parameters). The effect showed a highly significant result, $M_r = .53$, $Z = 5.60$, $p < .001$, two-tailed[4]. Thus, across the three studies, digital interaction did not fulfill the need to belong as good as face-to-face interactions.

| | *t* | *N* | *r* |
|---|---|---|---|
| Study 1 | 7.39 | 72 | .69 |
| Study 2 | 1.77 | 42 | .27 |
| Study 3 | 2.14 | 56 | .28 |

Table 4: *Relevant parameters for the meta-analysis*

## General Discussion

In three studies, we compared digital and face-to-face interactions in terms of satisfying the need to belong. In Study 1, we observed that people hold pessimistic beliefs about digital interactions not being as good as face-to-face interactions in satisfying the need to belong. In Study 2, we saw that people are

less responsive to nonverbal cues for belonging in digital interactions. In Study 3, we found that cues to digital interactions leave people sufficiently motivated to seek closeness to others. A meta-analysis across the three studies supports these results: Digital interaction did not satisfy the need to belong as good as face-to-face interactions.



## Theoretical Implications

This article sheds more understanding on the effectiveness of digital interactions, namely that (1) people's pessimistic beliefs influence how they interact in digital interactions, (2) that digital interactions might differ from face-to-face interactions in terms of responsiveness to nonverbal cues and (3) that people exposed to digital interactions have a motivation for closeness. It also supports the notion that mimicry is a means to convey belongingness.

We identify two characteristics that could explain why people experience less belonging in digital interactions: people's negative beliefs and the reduced responsiveness to nonverbal cues. Note that we explored these issues independently but it is entirely conceivable that both signal negative expectancies about what digital interactions can and cannot provide. Yet, the two concepts might highly influence each other. For example, a person might have had a very bad experience with a digital interaction, which in turns led to negative beliefs about digital interactions being an acceptable substitute for face-to-face interactions. Whenever this person engages in digital interactions these negative beliefs might be present and the responsiveness towards nonverbal cues might change. On the other side, a person, who is rather pessimistic about new technologies in general, might also be influenced by these negative beliefs and the responsiveness to nonverbal cues might also decrease. Pessimistic beliefs have a long history of fostering self-fulfilling prophecies in social interactions (Snyder & Stukas, 2000). Although most studies focused on the self-fulfilling prophecy in an educational system (e.g., expectations of teachers), per definition expectations in general lead to a self-fulfilling prophecy (Jussim, Eccles, & Madon, 1996). Such expectations might also occur towards new inventions and could result in self-fulfilling prophecies. In other words, it may be people's implicit beliefs about the limitations of digital interactions that make them less responsive to nonverbal cues and leaves them motivated to seek belonging. These beliefs are also not

necessarily inherent, but probably learned (e.g., via suboptimal experiences with digital interactions).

A second implication is that digital interactions compared to face-to-face interactions, disregarding the influence of people's negative beliefs, might convey less information, especially on a nonverbal level. Although participants could see each other over a webcam (Study 2), they still reported less feelings of belonging towards a confederate compared to participants who interacted face-to-face with the confederate. Research in therapy settings already suggests that digital sessions might lack the responsiveness to interpersonal and intrapersonal cues, which also exposure to nonverbal behavior (Ramyeyer, & Tschacher, 2011). So, something seems to be lost or rather cannot be conveyed in digital interactions. This might occur due to the inherent characteristics digital interactions have, namely that technical malfunctions occur, the two dimensional display and that touch is not possible.



Thirdly, we contribute to the existing literature on motivation, namely that digital interactions bear the risk of an unfulfilled need to belong, but and even more a longing for belonging. In other words, people are motivated to create closeness to another person after the exposure to digital interactions. This idea was based on the assumption that unfulfilled goals linger in the minds of people (Goschke & Kuhl, 1993; Masicampo & Baumeister, 2011). We support in Study 3 this assumption by showing that people who are exposed to digital interactions (compared to face-to-face) are motivated to place to chairs closer together, indicating that they like to be close to another person.

We should clarify that these results do not imply digital interactions are ineffective—sometimes they are the only way to communicate with others (Clerkin et al., 2013). Indeed, research has shown that elderly people, who normally feel lonely and impacts their health, can overcome this feeling by playing online video games (Hall et al., 2012). Yet, what these results do suggest is there are psychological or technological obstacles that could make it harder for digital interactions to fully satisfy the psychological need to belong. In other words, people should be aware that although digital interactions do have positive effects, the effects of face-to-face interactions might be to a greater extend.

Fourthly, we also add to the theoretical understanding of mimicry, namely that we showed that mimicry is a means to experience belongingness with others. Research so far has already pointed to many positive effects mimicry has on the relationship between interaction partners. For example, people like another person more when this person mimics them and mimicry is in general seen as an affiliation tool (Chartrand & Bargh, 1999; Chartrand & Van Baaren, 2009). Indeed, our research suggest that the purpose of mimicry as an affiliation tool might be to fulfill one's belongingness need. Babies start to imitate the facial expressions of their parents only a few hours after being born (Meltzoff & Moore, 1977). This might indicate that babies use mimicry to fulfill their bonding needs, which might include to signalize their caregiver early on what their need is. The importance and meaning of mimicry seems to be beyond the pure purpose of affiliating with others, it seems to also serve the purpose of being nurtured so that one can survive.

**Practical Implications**

Our research has practical implications for (1) using digital interactions as a substitute for face-to-face interactions and (2) the technology industry. Nowadays, digital interactions are often used as substitutes for digital interactions. For example, a couple who has a long distance relationship uses digital devices (e.g., Skype) to talk to and see each other. Yet, our research suggest that people do not experience the same fulfillment of their need to belonging in these digital interactions and leaves them with a motivation for the fulfillment of this need. This might mean that people feel particularly negative when hanging up leaving them in a state of loneliness and maybe even a depressed mood. Yet, loneliness is known to influence the physical health of people (Walker & Beauchene, 1991). Yet, using digital interactions as a substitute for face-to-face interactions might have severe consequences of people's psychological and physiological health.

Secondly, the technology industry might profit from our findings in terms of how to improve software and devices for digital interactions. The fact that digital interactions do not lead to the same experiences as face-to-face interactions do, computer scientists should try to improve the quality of digital interactions to make it more attractive for people and a real substitute for face-to-face interactions. For example, technical malfunctions might be in the same

way disturbing the conversational flow as other disruptions in conversations do. For example, a study showed that brief silence in groups affect their social needs (Koudenburg, Postmes, & Gordijn, 2011). In other words, it undermines the coordinate movement of an interaction. Technical malfunctions are very likely to also undermine the nonverbal coordination of interaction partners and might, therefore, have a negative influence on one's fulfillment of the need to belong.



**Limitations**

In our research we faced the limitation of small sample sizes due to costly research designs. Nevertheless, we encountered these shortcomings by measuring self-reports and behavioral outcome as well as by conducting a meta-analysis over our three studies as suggested by Goh, Hall and Rosenthal (2016). The result of the meta-analysis confirmed our assumption that digital interactions are not as good as face-to-face interactions in satisfying the need to belong. Therefore, we are confident that digital interaction lack something compared to face-to-face interactions. Yet, we encourage researchers to replicate our effects with a larger sample size.

Our behavioral measure in Study 3 might also be seen as weak. Indeed, one could argue that people place to two chairs closer together as digital interactions prime closeness. Yet, if indeed this is the case, the question evokes why we observe a difference between face-to-face interactions and digital interactions. Would our results then indicate that digital interactions prime closeness, but face-to-face interaction do not. However, in light of our findings from Study 1 that people hold pessimistic beliefs about digital interactions, this interpretation might be unlikely as closeness might be rather associated with a positive feeling than a negative. Therefore, we are confident that we observed a motivation for closeness, yet encourage researchers to replicate this effect with other measures.

**Future Research**

Additionally, future research could focus on the malfunctions of digital interactions. It might be that the use of virtual reality glasses might diminish the effect of the two-dimensional display and give people the feeling that they are actually together with this person. Indeed, if computer scientist would pair

this with a function of experiencing touch – for example that people feel when someone strokes their cheek or kisses them – people might experience the whole range of human behavior as would be possible in a face-to-face interaction.

Furthermore, research could investigate how people can overcome their pessimistic beliefs and how it influences their responsiveness to nonverbal cues in digital interactions. Pessimistic or negative beliefs might hinder people to freely engage in digital interactions with the other person. This phenomenon is well known in improvisation theater in which the first step is always known as to accept whatever has happened. For example, imagine you are on stage and some tells you to play a transsexual grandmother who tries to convince her family to raise money for an operation – the show has to go on. In the same ways, researchers could investigate whether accepting that some features are just not possible in digital interactions, but that it is better than not talking to or seeing this person, might help people to acknowledge digital interactions more and overcome their pessimistic beliefs.



**Conclusion**

Altogether, these studies suggest how and why digital interactions could leave us longing for belonging. People may not always be able to overcome the inherently virtual nature of digital interactions to fully satisfy their belonging needs. Yet, digital interactions give people already a possibility to interact with others further away, but still need to be improved to be a rivalry for face-to-face interaction.

## Notes

[1] Twenty-eight participants did not complete the questionnaire.

[2] This table was intended to create a situation as similar as possible to a webcam situation. Talking to a webcam includes a boundary, adding a table might be an equal boundary.

[3] Controlling for trust did not change the interaction effect, $F(1,78) = 5.69$, $p = .019$, $\eta_p^2 = .07$.

[4] Note that the within design (Study 1) could inflate the meta-analytic effect size due to more power.